PSYCHE.

THE FEMALE OF EUTERMES RIPPERTII.

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The ovarium of the imago.

The dark colored, mature-winged imago, taken out of the nest *before* swarming (therefore before copulation) was dissected. The color of the ovarium is pale and whitish. Each ovarium is connected within the ends of the metathorax with the dorsal vessel by a very fine filament. The end of the filament measures only .003 mm. in thickness, and in the middle between the insertion and the sudden dilatation of the ovarium the filament is .023 mm. in thickness. Each stigma sends a very large bundle of tracheae to the external part of the ovarium. Where the first bundle reaches the ovarium a rounded dilatation is to be seen, and from here the ovarium increases slightly. Nevertheless, its thickest part, just before the oviduct, though containing some eggs in an advanced stage of development, is only .512 mm. in thickness. The internal half of the whole length of the ovarium is somewhat paler and consists apparently of the filaments of the egg tubes, one running very near to the other, without any twisting and all so closely connected, that a separation is impossible. I was not able to observe in this internal part any tracheae. The external part is visibly darker and provided with very numerous tracheae. The bundles of the tracheae reach the ovarium in a horizontal direction in the beginning of the abdomen; those that follow go obliquely from behind forward to the ovarium, and rise there from a single main stem of .118 mm. in diameter, while the two bundles in the beginning of the abdomen rise from two or three smaller main stems. Just before reaching the ovarium, the main stem of the tracheae is suddenly divided into very numerous smaller branches, which enter the ovarium, divide again like a braid between the filaments and are curved there to provide the interior of the ovarium. Some remain externally on the superficies of the ovarium, and are divided into very fine branches running in an irregular, meandrous manner. The finest I was able to measure, were .003 mm. in thickness. Following the last attached bundle, the ovarium is pear-shaped, dilated, the egg tubes visible and dilated, and filled with a number of eggs, the largest ones, a dozen or more, of dark amber color and of the

same size as the ripe eggs of the queen. The size of the eggs before these diminish rapidly; only eight or nine were developed, and very similar to those in the queen; the three eggs in advance of the last one are darker with a series of elongated cells on each side; those before them shorter, nearly quadrangular, paler, all with a germinal vesicle and dot. Then come very small compartments, with egg-cells in transversal rows and farther on irregular cells in large numbers and very near together. The oviduct is inserted on the inferior end of the ovarium, just on the centre of its inferior end, first somewhat enlarged, then cylindrical, .157 mm. in thickness, and .641 mm. in length to the point, where it meets the oviduct of the opposite side; both forming together from here the large oviduct. The egg-canal in the centre of the ovarium does not reach beyond the point where the first (near the tip of the abdomen) bundle of tracheae is attached, and increases therefore later in length by the successive development of the ovarium.

The ovarium of the queen.

A queen of *Eutermes rippertii* .24 mm. in length, the abdomen .20 mm. long and .08 mm. in thickness, was dissected. After removing the dorsal part of the skin the whole abdomen appeared to be filled by the two ovaria. The queen was perhaps an old one, as there was very little fat along the outer side of the ovarium. In a queen of *Termes gilvus* and in another of *E. rippertii* a large layer of fat very richly provided with tracheae was found outside along the ovarium. Probably this fatty layer had been used up by the dissected queen of *E. rippertii*, as the rich net of tracheae was connected more closely below with the ovarium.

Each ovarium seen from above is a large cylinder, and both are placed so close together, that only a small median furrow for the dorsal vessel remains above between them.

The whole surface of the ovarium is light yellow and consists of very small egg tubes, beginning seemingly on the inner border of the ovarium, and forming bundles in the shape of flattened braids, running backward somewhat and later incurved outwards, winding down to the under side of the ovarium.

The basis of the ovarium near the end of the abdomen is thick, rounded and globular. The apex of the ovarium near the thorax follows strictly the outline of the abdomen, is somewhat globular but on the top has a more contracted part, adapted to the smaller size of the first abdominal segment. This part consists also of braids of egg tubes, arranged similarly to the parting of the hair. A small, cylindrical, yellow prolongation situated internally near this part reaches farther into the thorax to the dorsal vessel. This yellow cylinder is short, .139 mm. in thickness and ends with a quadrangular, somewhat hand-shaped, internal dilatation, concave below, and meeting the similar dilatation of the opposite ovarium. The yellow cylinder is formed of the filaments or thread-like ends of the egg tubes, closely

pressed together. From the external and anterior border of the hand-shaped dilatation a large number of more or less isolated, white, hyaline filaments .008 mm. in thickness, reach farther up to the dorsal vessel. These filaments are empty within, very small nuclei are attached to it externally, and a number of epithelial cells of different size, the largest .01 mm. in diameter, lay near by or around them. I believe that the hyaline filaments are parts of the external coat of the dorsal vessel, torn off by the dissection. Indeed, one or two are isolated, but the larger part form flattened slips. These parts are always very difficult to dissect, particularly in alcoholic specimens. In a large queen dissected by me many years ago, I was fortunate enough to prepare the dorsal vessel without separating the attachment of the ovaria, forming a thicker fatty ring around the whole dorsal vessel, and the same fact was stated to be true with the queen of the honey bee by Dr. Knoch of St. Petersburg.

In another queen of *E. rippertii* the insertion of the ovaria to the dorsal vessel was carefully prepared.

Shortly before the dorsal vessel is inflated to the metathorax to send down the smaller aorta, the filaments of both ovaries are attached to the under side. The attachment is very firm and covered above and below with muscles; therefore, torn-off parts of the dorsal vessel and muscles are retained, forming a somewhat hand-shaped process.

Both filaments are united in a semicircular curve, so that as far as I can observe the two ovaria are fused together. At least I was not able to see any end of the filaments. The winged muscles in which the side vessels are laying (W. Peters Reise nach Mozambique, 1862, Vol. 5, Neuroptera by H. A. Hagen, p. 75, pl. 4 fig. 3) send a triangular bunch above the filament and another below, both inserting partly on the dorsal vessel partly on the filament, originating on each side of the dorsal vessel in an elongated bundle of fat and epithelial cells. I tried polarization to see better the difference between the muscles and filaments without success, the number of the muscular fibres being too large, and strongly mixed by their insertion of the filaments, even running along their interior curved border.

The ovarium seen from the side is near the thorax only half as thick as near the end of the abdomen; it is gradually enlarged, the basis rounded, globular. The internal side of the ovarium is straight and flattened, as both ovaria are very near each other. The yellowish cylinder of the apex of the ovarium is prolonged along the internal side in a yellow flattened band 1 mm. broad, running in a straight line a little below the upper border of the ovarium, which is convex and formed by the beginning of the braids. Therefore when the bands of both ovaria are laying close together, there is always left above them a small groove for the dorsal vessel. The inferior border of the band is straight, very sharp and separated somewhat from the ovarium. The band has entirely the shape and the appearance of a tendon, which towards

the end of the abdomen is divided into divergent and downward bent branches. The band as well as its cylindrical, apical prolongation is formed by the fine filaments of the egg tubes very closely pressed together. There does not exist a separate thread beginning at the base of the abdomen and united with the filaments of the following tubes, as observed by Mr. Stein in other insects. So far I was able to follow the filaments each of them is prolonged to the apex, all running together.. I was not able to find a connection in a loop of the ends of the filaments, as observed by Mr. Leydig in other insects, but I confess that I was not able to separate the ends, which are very delicate.

The ovarium is covered below the bands with braids of egg tubes just as above, but towards the base tubes with more developed eggs or even ripe eggs begin to be visible and become by and by prevailing. Of course this will be different in young queens; in one of *T. gilvus*, for instance, the whole ovarium was covered with braids, and only after removing them the more developed eggs appeared.

An egg-canal (the beginning of the oviduct) extends through the whole ovarium, the calyx of Dufour and Stein. It is situated in the centre of the ovarium and begins blind near the first segment of the abdomen, runs at first straight, but soon makes a flattened curve downward to the middle of the length of the ovarium, followed by a similar flattened curve upwards. In the last fourth of the ovarium the canal is sloping down, and shortly before the end bent downwards and inwards, and continued in a free, short, cylindrical tube, meeting the canal of the opposite side, where the oviduct begins. This egg-canal is pale yellow and somewhat fleshy, at the beginning .32-.38 mm. in thickness and becomes gradually thicker, towards the end it is .64-.77 mm. It begins as a hollow tube, just large enough to allow the passage of one egg, but the part near the oviduct is always somewhat dilated, when the eggs have to pass through it.

Around the egg-canal the egg tubes are perpendicularly inserted so near each other, that nothing of the outer surface of the egg-canal remains free. Every egg tube is inserted in a short fleshy cylinder, with a concave dish on top, and a hole in the middle, much smaller than the egg. I counted around the blind beginning of the egg-canal six to eight cylinders, but a part taken out of the middle of the ovarium showed about ten to twelve cylinders, very irregularly placed, and about 20 rows in a part of the egg-canal of 4 mm. in length. The cylinders are .3 mm. in length and less thickened. A part of the egg-canal of 4 mm. in length possesses at least 240 cylinders, and as the egg-canal by its curves is longer than the ovarium, there must be at least 1500 cylinders and egg tubes. But as the insertion towards the end of the abdomen is very irregular and closely pressed, I believe even this number is probably too small. The whole substance of the egg-canal is very brittle, at least in alcoholic specimens.

The egg tubes are unequal in length; those nearer to the thorax are the shortest, and inserted directly in the beginning of the egg-canal; those nearer to the tip of the abdomen are the longest, and, being incurved, may be somewhat longer than the ovarium. I think it by no means improbable that the fine filaments of all the egg tubes may reach the dorsal vessel. At least I was not able to find the end of any filament before that point, and the finest filaments in the band measures only .001 mm. in thickness. Therefore the cylindrical prolongation at the apex of the ovarium .139 mm. in diameter would be thick enough to contain several thousand filaments, as they are here thinner than in the band. The white hyaline filaments originating from the border previously described belong to the hand-shaped dilatation and cannot be connected with the egg tubes, being of a much larger diameter, .008 mm.

The beginning of the egg tubes was empty in the queen of *E. rippertii*, only later they are filled with irregularly placed nuclei; but the apparently younger queen of *T. gilvus* showed the egg tubes filled with such nuclei directly from the beginning of the tubes. Then follow elliptical epithelial cells with nuclei, placed one after the other. The tube of .016 mm. diameter begins to show short transversal compartments, each with three rows of transversally placed egg-cells, followed by somewhat irregular compartments, containing rounded cells each with a germinal vesicle and dot; the cells are placed very nearly together. Then follow quadrangular compartments with a single egg, filled with epithelial cells with nucleoli, and series of elongated cells about ten in number along each side. These compartments become by and by more elongated, with eighteen elongated cells on each side, the contents of the eggs grow darker, and the germinal vesicle smaller. The following eggs are filled with globular cells each containing a strongly reflecting dot, and later suddenly after three or four successive larger ones appear ripe eggs of dark amber color with a less visible germinal vesicle. They are .106 to .113 mm. in length and .076 to .079 mm. in thickness; the germinal vesicle is .033 to .035 mm. in diameter, the germinal dot .006 to .008 mm. in diameter. These eggs have sixteen to eighteen cells along each side, and eight to nine such cells along the smaller sides. The longer sides of the compartments are rounded. The size of the eggs increases till they are ready to be laid. I took several measures of eggs .118 mm. in length and .102 mm. in thickness with a germinal vesicle of .102 mm. in diameter and a germinal dot of .015 mm. in diameter; of riper eggs .307 mm. in length and .256 mm. in thickness; the largest eggs .710 to .769 mm. in length and .318 to .581 mm. in thickness. The disc of the cylinders in which the egg tubes are inserted measures .217 to .256 mm. in diameter, and the central hole, through which the egg has to pass .038 to .051 mm.; therefore this hole has to undergo a remarkably large dilatation, about ten times its diameter to

allow the passage of the largest eggs.

There are nowhere the so-called compartments for nutrition; each egg follows the other, but the ripe ones are connected by darker funiculi, containing epithelial cells, and around them rounded cells with a nucleus. The interior membrane of the egg tubes is structureless and hyaline, not very easily seen. The exterior membrane is fibrous, and around the larger eggs shows often lacunes and holes filled with epithelial cells with nuclei. The connecting parts around the lacunes are often small and of decided muscular appearance. In the part between two eggs the membrane is striated longitudinally.

The chorion of ripe eggs in the tubes shows sexangular spaces, the borders between them comparatively wide and hyaline. The centre of these spaces are darker and filled with pavement cells, round, of .015 mm. in diameter, with numerous fine dark spots.

I was not able to find the micropyle in eggs contained in the ovarium. The micropyle of laid eggs is dorsal a little before the inferior pole; there are ten to twelve little holes somewhat different *in situ*, forming small funnels with a stem as long as the diameter of the holes. Near them numerous filiform spermatozoa (?) were seen. The eggs are cylindrical, concave on one side, the ends rounded a little; often one end thicker; the yolk corpuscula .012 to .025 mm. in thickness.

The dissected queens of *E. rippertii* were from Jamaica and Cuba, of *T. gilvus* from Rangoon, Burmah. *E. rippertii* is probably the long sought for imago of *Termes devastans*, Kollar. The above is a part of a proposed monograph of the anatomy of the *termitina* for which a large number of figures have been made.

SECOND CONTRIBUTION TO A KNOWLEDGE OF THE AUTUMN LIFE-HISTORY OF CERTAIN LITTLE KNOWN APHIDIDAE.*

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The present paper is the result of a continuation of the study of the autumn life-history of the *aphididae*, begun in Illinois in 1887. The observations here recorded were made at Columbus, Ohio, during the autumn of 1888, upon the grounds connected with the Ohio State University.

Melanoxanthus salicti (Harris).

This species was first described by Dr. Harris in his treatise on insects injurious to vegetation as *Aphis salicti*.* In the Flint edition of the Treatise, however, Mr. Uhler states in a foot-note that the specific name had been "long ago appropriated by

* For the first article of this series see *Psyche*, Nov.-Dec., 1888, v. 5, p. 123-134.

* *1st* ed., 1842, p. 190-191; *2nd* ed. 1852, p. 208-209 Flint ed., 1862, p. 239.